

1 WHAT IS CLAIMED IS:

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3 1. An integrated hydroconversion process for the treatment of
4 Fischer-Tropsch products including a first hydrocarbon stream
5 comprising a wax and a second hydrocarbon stream comprising a
6 condensate, the process having at least two stages, a hydrocracking
7 stage and a hydrotreating stage, each stage possessing at least one
8 reaction zone, wherein the process comprises the following steps:

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10 (a) combining a first hydrocarbon stream with a first hydrogen-rich
11 gaseous stream to form a first feedstock;

12

13 (b) passing the first feedstock of step (a) to a hydrocracking reaction
14 zone, which is maintained at hydrocracking conditions, to form a
15 hydrocracking zone effluent comprising normally liquid phase
16 components and normally gaseous phase components;

17

18 (c) passing the hydrocracking zone effluent of step (b) to a heat
19 exchanger or series of exchangers, where it is cooled;

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21 (d) separating the components of the cooled effluent of step (c) into a
22 vapor stream and a liquid stream;

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24 (e) combining the vapor stream of step (d) with the second
25 hydrocarbon stream to form a second feedstock, the liquid stream
26 of step (d) being passed to lubricant production or to further
27 processing for manufacture of fuel and diesel products;

28

29 (f) passing the second feedstock of step (e) to a hydrotreating zone,
30 which is maintained at conditions sufficient for reducing the content

of sulfur, nitrogen, oxygenates and unsaturates present in the second hydrocarbon stream, to form a hydrotreating zone effluent;

(g) separating the hydrotreating zone effluent of step (f) into a liquid stream comprising products and a second hydrogen-rich gaseous stream;

(h) passing the liquid stream of step (g) to further processing, and passing the hydrogen-rich gaseous stream of step (g) to further separation into a light hydrogen-rich gaseous stream, and a stream comprising liquid products; and

(i) recycling at least a portion of the hydrogen-rich gaseous stream of step (h) to the hydrocracking zone and hydrotreating zones.

15 2. The process of claim 1, wherein the liquid stream comprising products of
16 step (h) is passed to further separation into a liquid products stream as
17 well as light gaseous components which are sent to fuel gas.

19 3. The process of claim 1, wherein the liquid products stream of claim 2 is
20 sent to fractionation and separated into product streams comprising gas
21 or naphtha stream which are removed overhead, one or more middle
22 distillate streams, and a bottoms stream suitable for further processing.

24 4. The process according to claim 1, wherein further processing for
25 manufacture of fuel and diesel products of the liquid stream of step (d)
26 further comprises:

(a) combining the liquid stream of claim 1, step (d), with the liquid fraction of claim 1, step (g), to form a single stream:

1 (b) separating the single stream of step 4(a) into a light stream and a
2 heavy stream, the heavy stream being sent to fractionation;

3

4 (c) combining the light stream of step 4(b) with the products stream of
5 claim 1, step (h), to form a single stream; and

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7 (d) separating the single stream of step 4(c) into a light gaseous
8 stream and a liquid products stream, the light gaseous stream
9 proceeding to fuel gas and the liquid products stream proceeding
10 to fractionation.

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12 5. The process according to claim 1, wherein the hydrocracking zone of
13 step 1(b) is maintained at conditions sufficient to effect a boiling range
14 conversion of the first hydrocarbon stream of at least about 25%.

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16 6. The process according to claim 5, wherein the hydrocracking zone of
17 step 1(b) is maintained at conditions sufficient to effect a boiling range
18 conversion of the first hydrocarbon stream of between 30% and 90%.

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20 7. The process according to claim 1, wherein the waxy first hydrocarbon
21 stream of claim 1 has a normal boiling point greater than about 600°F.

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23 8. The process according to claim 1, wherein the second hydrocarbon
24 stream of claim 1 has a normal boiling point below 700°F.

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26 9. The process according to claim 8, wherein the second hydrocarbon
27 stream boils in the range C₅-650°F.

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29 10. The process according to claim 1, wherein the reaction zone of step 1(b)
30 stage is maintained at hydrocracking reaction conditions, including a
31 reaction temperature in the range from about 340°C to about 455°C

1 (644°F-851°F), a reaction pressure in the range of about 3.5-24.2 MPa
2 (500-3500 pounds per square inch), a feed rate (vol oil/vol cat h) from
3 about 0.1 to about 10 hr⁻¹ and a hydrogen circulation rate ranging from
4 about 350 std liters H₂/kg oil to 1780 std liters H₂/kg oil (2,310-11,750
5 standard cubic feet per barrel).

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7 11. The process according to claim 1, wherein the reaction zone of step 1(g)
8 is maintained at hydrotreating reaction conditions, including a reaction
9 temperature in the range of from about 150°C to about 500°C
10 (302°F-932°F), a reaction pressure in the range of from about 2.1 MPa
11 to 24.2 MPa (300-3,500 psi), a feed rate (vol oil/vol cat hr⁻¹) from about
12 0.1 to about 20 hr⁻¹, and a hydrogen circulation rate in the range from
13 about 350 std liters H₂/kg oil to 1780 std liters H₂/kg oil (2,310-11,750
14 standard cubic feet per barrel).